



Securing India's Nuclear Future

This editorial is based on [“Election rhetoric, nuclear weapons and Pakistan- the need to expand debate”](#) which was published in The Indian Express on 28/05/2024. The article brings into picture the shifting global nuclear dynamics. It argues that India should modernize its nuclear capabilities and energy program to address these evolving threats.

For Prelims: [Comprehensive Nuclear Test Ban Treaty](#), [NATO](#), [Ballistic Missiles](#), [Nuclear Suppliers Group](#), [2011 Fukushima Nuclear Disaster](#)

For Mains: Current Nuclear Threats that India Faces, Evolving Nuclear Landscape Globally.

The world is witnessing a resurgence of **nuclear anxieties**. The [Russia-Ukraine war](#) and China's assertiveness are prompting a rethink on nuclear deterrence strategies. In Europe, talk of strengthening [NATO's nuclear forces](#) and collaboration between France and Britain is gaining ground. Similarly, anxieties about [Iran's nuclear program](#) are pushing Arab nations towards acquiring atomic capabilities. Meanwhile, the rise of [Artificial intelligence](#) and robotic weapons raises concerns about the **automation of nuclear decision-making**.

For India, while Pakistan's nuclear arsenal remains a concern, a bigger threat is emerging from China's rapidly expanding nuclear program. India needs to prioritize modernizing its nuclear arsenal and civilian nuclear energy program to counter these challenges.

How is the Nuclear Landscape Evolving Globally?

- **Russia-Ukraine War:** Russia's veiled threats of using nuclear weapons during the Ukraine conflict have shattered Europe's sense of security.
 - This has led to discussions within **NATO** about strengthening its nuclear forces and potential collaboration between France and Britain on their nuclear arsenals.
 - Russia has also withdrawn from ratification of the [Comprehensive Nuclear Test Ban Treaty](#).
- **China's Nuclear Expansion:** China is rapidly expanding its nuclear arsenal, with estimates suggesting a potential tenfold increase by 2035.
 - This significant build-up, coupled with [China's assertive territorial claims in Asia](#), is prompting anxieties amongst its neighbors.
 - Countries like Japan and South Korea are re-evaluating their reliance on the US "**nuclear umbrella**" and considering potential nuclear programs of their own.
- **Iran's Nuclear Program:** Iran's ongoing nuclear program, despite international efforts to curb it, continues to be a source of concern for the **Middle East**.
 - This has intensified fears of a regional nuclear arms race as Arab nations like **Saudi Arabia** reportedly are exploring options for acquiring nuclear capabilities to counterbalance Iran's potential.

- **North Korea's Nuclear Activity:** North Korea's continued development and testing of [ballistic missiles](#) and nuclear weapons remains a major security threat in East Asia.
 - This has led to increased tensions with [South Korea](#) and heightened anxieties in the region.
- **Modernization of Nuclear Arsenals:** Even established nuclear powers like the **US and Russia** are modernizing their nuclear arsenals, raising concerns about a potential arms race and lowering the threshold for nuclear use.
- **Erosion of Arms Control Treaties:** The breakdown of key arms control treaties, like the [Intermediate-Range Nuclear Forces Treaty between US and Russia \(erstwhile Soviet Union\)](#), has weakened international frameworks for managing nuclear stockpiles and fostering nuclear disarmament efforts.

What is India's Historic Stance on Nuclear Energy and Usage of Nuclear Weapons?

- **1948:** The Atomic Energy Commission is established, with **Homi J. Bhabha** as its chairman, to spearhead India's nuclear program.
- **1956:** India's first nuclear reactor, Apsara, becomes operational, marking the beginning of its nuclear research program.
 - This was not only first in India but was also the first reactor in whole of Asia
- **1968:** India refused to sign the **Nuclear Non-Proliferation Treaty**.
- **1969:** India's first commercial nuclear power plant, **Tarapur Atomic Power Station**, under the agreement between **India, the United States**, and the International Atomic Energy Agency (IAEA)
- **1974:** India conducts its first underground nuclear test, codenamed "**Smiling Buddha**," at **Pokhran**, officially labeling it a peaceful nuclear explosion.
- **1995-1996:** India opposed the indefinite extension of the NPT and also refused to sign the [Comprehensive Test Ban Treaty \(CTBT\)](#).
- **1998:** India carries out a series of nuclear tests at Pokhran codenamed **Operation Shakti**, declaring itself a nuclear-armed state.
 - India adhered to a self-imposed commitment to 'No First Use' (NFU) of nuclear weapons on another country.
- **2003:** **India and Pakistan** agree to a ceasefire along the [Line of Control](#) in Kashmir, reducing the risk of nuclear escalation.
- **2005:** The United States and India reach a landmark civil nuclear agreement, paving the way for nuclear cooperation and fuel supplies.
- **2008:** The [Nuclear Suppliers Group \(NSG\)](#) grants India a waiver, allowing it to engage in nuclear trade despite its **non-NPT status**.
- **2016:** India gains entry into the **Missile Technology Control Regime (MTCR)**.
- **2019:** India successfully tests its anti-satellite missile capability, demonstrating its ability to shoot down low-orbit satellites.
- **2024:** India initiated the core loading of **India's Prototype Fast Breeder Reactor (PFBR)** at **Kalpakkam, Tamil Nadu** marking a significant milestone in India's nuclear program.
 - The PFBR is part of **India's three-stage plan** to harness its thorium reserves for sustainable nuclear energy.

Why did India not Sign NPT and CTBT?

- **Nuclear Non-Proliferation Treaty (NPT):** India views the NPT as discriminatory as it categorizes states as "**nuclear weapon states**" (**NWS**) and "**non-nuclear weapon states**" (**NNWS**).
 - NWS like the **US, Russia, UK, France, and China** can retain their nuclear arsenals, while NNWS are obligated to give up pursuit of nuclear weapons.
 - India perceives this as **unfair** and hindering its right to self-defense.
 - India remains committed to the goal of universal, non-discriminatory and verifiable nuclear disarmament, **which the NPT does not explicitly call for**.
- **Comprehensive Test Ban Treaty (CTBT):** India emphasizes the importance of maintaining a credible minimum nuclear deterrent against potential threats, particularly from neighboring **Pakistan and China**.

- Signing the CTBT, which bans all nuclear explosions for military or civilian purposes, could limit **India's ability to further develop and refine its nuclear arsenal.**

What are the Current Nuclear Threats that India Faces?

- **India's Neighbourhood Nuclear Threats:** Pakistan possesses a substantial nuclear arsenal, estimated to be around **170 warheads**. The long-standing tensions between India and Pakistan over issues such as **Kashmir** and **cross-border terrorism** raise the risk of nuclear escalation in the event of a conflict.
 - China's construction of numerous **missile silos** and the deployment of **road-mobile intercontinental ballistic missiles (ICBMs)** have raised concerns in India about the shifting nuclear balance in the region.
- **Command and Control Vulnerabilities:** The safety and security of nuclear command and control systems are critical, and any vulnerabilities or potential for unauthorized access or cyberattacks could have severe consequences.
 - Example: The 2019 **alleged cyberattack on one of India's Kudankulam Nuclear power plant**, although denied by officials, highlighted the need for robust cybersecurity measures in the nuclear realm.
- **Environmental and Health Risks:** The risks associated with nuclear accidents, radioactive contamination, and long-term environmental and health impacts pose challenges for India's expanding nuclear energy program.
 - **Example:** The **2011 Fukushima nuclear disaster in Japan** underscored the need for stringent safety protocols and emergency preparedness measures for nuclear facilities.
- **Emerging Technologies and Regional Arm Race:** The rapid development of **hypersonic missiles**, autonomous weapons systems, and **artificial intelligence (AI)** raises new challenges for nuclear deterrence strategies.
 - India's development of its own hypersonic missile capabilities, while aimed at deterrence, **could contribute to a regional arms race.**

What Measures Should India Adopt to Strengthen its Nuclear Program?

- **Pursue Responsible Nuclear Modernization:** While maintaining a credible minimum deterrence, India should focus on **responsible nuclear modernization**.
 - This involves developing advanced delivery systems, improving the survivability and reliability of its nuclear forces, and exploring emerging technologies such as **directed energy systems**.
 - **Enhance Nuclear Risk Reduction Measures:** India should actively engage in nuclear risk reduction measures with neighboring nuclear-armed states, **particularly Pakistan and China**.
 - This can involve **confidence-building measures**, crisis communication mechanisms, and agreements to prevent inadvertent escalation or misunderstandings during crises.
 - **Invest in Advanced Nuclear Technologies:** India should continue to invest in advanced nuclear technologies, such as **thorium-based reactors, small modular reactors, and next-generation nuclear power plant designs**.
 - This can help address India's long-term energy needs while minimizing environmental and safety risks.
 - **Enhance Civilian Nuclear Cooperation:** India should seek to **expand civilian nuclear cooperation** with like-minded countries and organizations.
 - This can involve joint research and development projects, technology sharing, and collaboration in areas such as nuclear waste management, nuclear medicine, and peaceful applications of nuclear technology.
 - **Participate in Global Nuclear Governance Initiatives:** India should actively participate in global nuclear governance initiatives, such as the **Nuclear Security Summits and Global Initiative to Combat Nuclear Terrorism (GICNT)**.
 - This would demonstrate India's commitment to nuclear non-proliferation and the peaceful use of nuclear technology.
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Drishti Mains Question:

Discuss the evolving global nuclear dynamics in the context of recent geopolitical developments. How should India respond to the nuclear challenges especially posed by neighboring countries?

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q. In India, why are some nuclear reactors kept under “IAEA safeguards” while others are not? (2020)

- (a) Some use uranium and others use thorium
- (b) Some use imported uranium and others use domestic supplies
- (c) Some are operated by foreign enterprises and others are operated by domestic enterprises
- (d) Some are State-owned and others are privately owned

Ans: (b)

Mains

Q. With growing energy needs should India keep on expanding its nuclear energy programme? Discuss the facts and fears associated with nuclear energy. (2018)

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